

32. (Once amended) The method according to claim 31 where diffusion soldering comprises using layers comprising copper, silver, tin, indium and combinations and mixtures thereof.

33. (Once amended) The method according to claim 28 where eliminating at least one fixture bridge comprises applying an electric current across the bridge.

34. (Once amended) A method for making an array of devices, comprising:
providing plural laminae where at least one of the plural lamina has an array of at least two assemblies, each assembly in the array comprising at least one structure, at least one substructure, and at least one fixture bridge, such that at least one of the structures and at least one of the substructures define a space therebetween, and at least one substructure is coupled to at least one structure by at least one fixture bridge across the space; and
dissociating at least one substructure from the structure to which it is coupled by eliminating the fixture bridge, thereby making an array of devices.

Sub 31
De 1/21

electrical current

35. (Once amended) The method according to claim 34 where at least one of the assemblies includes plural substructures and at least one substructure is coupled to at least one other substructure by at least one fixture bridge.

36. (Once amended) The method according to claim 34 where dissociating each substructure from its coupled structure by eliminating the fixture bridge comprises applying an electrical current across the fixture bridge sufficient to eliminate the fixture bridge.

37. (Once amended) The method according to claim 34 where dissociating each substructure from its coupled structure by eliminating the fixture bridge comprises:
heating the fixture bridge; and
selectively chemically eliminating the fixture bridge.

38. (Once amended) The method according to claim 37 where at least one fixture bridge is heated to a temperature sufficient to allow the chemical to selectively dissolve the fixture bridge.

39. (Once amended) The method according to claim 37 where a chemical is provided at a concentration, pH, and temperature sufficient to selectively dissolve at least one of the fixture bridges.

40. (Once amended) The method according to claim 39 where the chemical is selected from the group consisting of acids, bases, oxidizing agents, and mixtures thereof.

41. (Once amended) The method according to claim 37 where heating the fixture bridge comprises applying an electrical current across the fixture bridge.

42. (Once amended) The method according to claim 34 where the manner of dissociating the substructure from the structure by eliminating a fixture bridges comprises:

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placing an electrode on each substructure to be dissociated;
contacting the structure, coupled to the substructure, with a second electrode; and
applying a current through the electrodes.

43. (Once amended) The method according to claim 34 further comprising:
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registering the plural laminae; and
bonding the plural laminae one to another to form an array of monolithic devices.

electro diffusion bonding
44. (Once amended) The method according to claim 43 where the manner of bonding the plural laminae one to another to form an array of monolithic devices is selected from the group consisting of diffusion soldering, diffusion bonding, thermal brazing, adhesive bonding, thermal adhesive bonding, curative adhesive bonding, electrostatic bonding, microprojection welding, resistance welding, and combinations thereof.
electrostatic bonding

45. (Once amended) The method according to claim 39 where dissociating each substructure from the structure to which it is coupled by eliminating the fixture bridge is performed after the plural laminae are registered and bonded.

46. (Once amended) The method according to claim 34 where dissociating each substructure from the structure to which it is coupled by eliminating the fixture bridge is performed before the plural laminae are registered and bonded.

47. (Once amended) The method according to claim 46 further comprising:
filling the space between a structure and its coupled substructure with a fixative prior to eliminating the fixture bridge;
eliminating the fixture bridge; and
eliminating the fixative.

48. (Once amended) The method according to claim 47 where the fixative is wax.

49. (Once amended) The method according to claim 47 where the fixative is eliminated by heating.

50. (Once amended) The method according to claim 34 where the manner of forming the plural laminae is selected from the group consisting of additive freeform fabrication, rapid prototyping, microlamination, metal microlamination, and micromechanical fabrication.

51. (Once amended) The method according to claim 34 where the manner of forming the array of structures and coupled substructures is selected from the group consisting of micromachining, laser photoablation, chemical micromachining, electrochemical micromachining, and through-mask electrochemical micromachining.

52. (Once amended) The method according to claim 34 where forming the array of structures and coupled substructures includes lamina preparation.

53. (Once amended) The method according to claim 52 where the manner of lamina preparation is selected from the group consisting of chemical etching, acid etching, electropolishing, oxide-free coating, and mixtures thereof.

54. (Once amended) The method according to claim 34 where at least one of the lamina is made from a material selected from the group consisting of metals, polymers, ceramics, composites, stainless steel, carbon steel, phosphor bronze, metal alloys, and mixtures thereof.

55. (Once amended) The method according to claim 34 where the device is selected from the group consisting of micromechanical systems, microelectromechanical systems, miniature energy and chemical systems, microthermal systems, microthermomechanical systems, cryocoolers, Stirling cycle cryocoolers, heat pumps, compressors, thermal compressors, refrigerators, heat engines, valves, nozzled valves, ink jet print head valves, fuel cells, fuel combustors, fuel processors, and systems comprising one or more of these devices.

56. (Once amended) The method according to claim 34 where the device includes at least one high-aspect-ratio microchannel with a ratio of height-to-width of at least 20:1.

57. (Once amended) The method according to claim 34 where the size of the device is microscale.

58. (Once amended) The method according to claim 34 where the size of the device is meso-scale.

59. (Once amended) A method for welding laminae, comprising:
providing at least one lamina with at least one projection, made of a material suitable for welding;
placing the laminae in contact with at least one other lamina at the site of the projection; and
applying a current through the projection sufficient to weld the laminae one to another, thereby making the device.

60. (Once amended) The method of claim 59 where the current is applied through plate electrodes.

61. (Once amended) The method according to claim 59 where the material suitable for welding is selected from the group comprising mild steel, carbon steel, low carbon steel, weldable stainless steel, gold, copper, and mixtures thereof.

62. (Once amended) A method for bonding laminae having microstructures thereon, comprising:
providing plural laminae;
registering the laminae;
diffusion soldering the laminae one to another at a temperature and pressure that do not form soldering flash that restricts flow in or through features.

63. (Once amended) The method according to claim 62 where the pressure is from about 2 Mpa to about 5 Mpa.

64. (Once amended) A method for making a device, comprising:
providing plural laminae, at least one of which is a patterned intermetallic;
registering a stack of the plural laminae including at least one patterned intermetallic;
bonding the stack to form a bonded stack; and
making a device from the bonded stack.

REMARKS

A. Election and Designation of Claims in Response to Restriction Requirement

Applicants provisionally elect with traverse claims 1-59 (designated 1-58 in the Restriction Requirement) of Examiner's Group I for examination.

Furthermore, the Restriction Requirement included two species designation requirements.

Applicants designate diffusion bonding in response to the first species requirement. Claims 1-30 and 34-